

To: James Cashwell  
From: Chris Ricardi  
Date: August 10, 2012  
Subject: Interim Response Steps Work Plan Slurry Wall Monitoring Program 2Q12–  
May/June 2012

**DATA VALIDATION REPORT  
MAY/JUNE 2012 SLURRY WALL GROUNDWATER AND SURFACE WATER  
OLIN CHEMICAL SUPERFUND SITE  
WILMINGTON, MASSACHUSETTS**

**TestAmerica Laboratories Data Sets: 360-40743-1, 360-40846-1, 360-40979-1, 360-40979-2, and 360-40991-1**

**1.0 INTRODUCTION**

Groundwater and surface water samples were collected from the Olin Chemical Superfund Site from May 23 to June 7, 2012. Samples were analyzed by TestAmerica Laboratories Inc. in Westfield, Massachusetts. Data were reported in sample delivery groups (SDGs) 360-40743-1, 360-40846-1, 360-40979-1, 360-40979-2 and 360-40991-1. A summary of samples included in this review is contained in Table 1. Samples reviewed in this report were analyzed for the following USEPA SW-846 (USEPA, 1996), USEPA wastewater (USEPA, 1993), or Standard Methods (APHA, 1995):

- Dissolved Metals (aluminum and chromium) by USEPA Method 6010B in groundwater
- Dissolved and Total Metals (aluminum, chromium, and sodium) by USEPA Method 6010B in surface water
- General chemistry analyses for ammonia by USEPA Method 350.1 (Lachat 10-107-06-1B), chloride, nitrate, nitrite, and sulfate by USEPA Method 300.0, and specific conductance by SM 2510B

The Final Interim Response Steps Work Plan (MACTEC, 2007) and the MassDEP Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP) [MassDEP, 2010] were used as references during the review. Analytical packages were reviewed using the Level 1 Data Quality Evaluation checklists that were developed for the Olin Wilmington monitoring tasks. Final sample results are presented on data summaries in Table 2. A summary of validation qualification actions is presented on Table 3. Validation reason codes are associated with final results that have been qualified as indicated in Table 3.

## 2.0 METALS

Data were reviewed for the following parameters:

- \* Data Completeness
- \* Holding Time
- \* Blanks
- \* Laboratory Control Sample / Laboratory Control Sample Duplicate Analysis (LCS/LCSD)  
Matrix Spike/Matrix Spike Duplicate Analysis
- \* Field Duplicate Results
- \* Detection Limits  
Dissolved vs. Total Metals Comparison (surface water only)

\* indicates that criteria were met for this parameter

### Matrix Spike/Matrix Spike Duplicate Analysis

#### **SDG 360-40979**

Sample OC-SW-PZ-18RSW was submitted for Matrix Spike Analysis. The percent recovery of total sodium (68) was below the lower limit QC limit of 75. Results for total sodium in SDG 360-40979 were qualified estimated (J).

### Dissolved vs. Total Metals Comparison

#### **SDG 360-40979**

The concentration of chromium in the dissolved fraction of sample OC-SW-16RRSW is over ten percent greater than the concentration reported in the total fraction (14%) This limit applies where the sample results are greater than five times the reporting limit. The results in these samples were qualified estimated (J).

Dissolved metal concentrations reported by the laboratory have historically been higher (greater than ten percent) than total concentrations for some surface water samples. This difference in concentrations may have been caused by the difference in viscosity between the total and dissolved sample. The viscosity of the total sample fraction was higher than the dissolved fraction due in part to the total sample undergoing an acid preparation step prior to analysis. Dissolved samples historically did not undergo this procedure prior to analysis. In an effort to normalize the viscosity between the total and dissolved fractions, the laboratory was instructed to perform the acid preparation step on the dissolved samples prior to analysis for this sampling event. The laboratory analyzed the dissolved samples with and without an acid preparation and reported both sets of data. During validation, the dissolved samples were reported from the analyses that underwent the acid preparation procedure. Dissolved results from the acid preparation more closely matched concentrations from the total analyses. In most samples

from the acid preparation runs, the concentration of metals in the dissolved fraction were lower than the concentrations in the total fraction, which was not the case in the samples where the dissolved fraction without acid preparation.

### 3.0 GENERAL CHEMISTRY – Ammonia, Chloride, Sulfate, Nitrate, Nitrite, and Specific Conductance

Data were reviewed for the following parameters:

- \* Data Completeness
- \* Holding Time
- \* Blanks
- \* Matrix Spike Analysis (sulfate and chloride in groundwater only)
- \* Field Duplicate Analysis
- \* Laboratory Duplicate Analysis
- \* Laboratory Control Sample/Laboratory Control Sample Duplicate Analysis
- Detection Limits

\* indicates that criteria were met for this parameter

#### Detection Limits

Nitrite quantitation limits were reported above the project goal of 0.01 mg/L due to dilution in the following samples:

#### **SDG 360-40979**

SDG	Lab Sample ID	Field Sample ID	Parameter	Final Result (mg/l)	Final Qual	Dilution Factor
360-40979	360-40979-1	OC-ISCO1-SW	Nitrite as N	0.1	U	10
360-40979	360-40979-2	OC-ISCO2-SW	Nitrite as N	0.1	U	10
360-40979	360-40979-3	OC-ISCO3-SW	Nitrite as N	0.1	U	10
360-40979	360-40979-4	OC-SW-PZ16RR-SW	Nitrite as N	0.1	U	10
360-40979	360-40979-5	OC-SW-PZ-17RR-SW	Nitrite as N	0.1	U	10
360-40979	360-40979-6	OC-PZ18R-SW	Nitrite as N	0.1	U	10
360-40979	360-40979-7	OC-SD-17-SW	Nitrite as N	0.1	U	10
360-40979	360-40979-8	OC-PZ18R-SW DUP	Nitrite as N	0.1	U	10

Unless discussed above, sample results are interpreted to be usable as reported by TestAmerica.



Chris Ricardi, NRCC-EAC  
Senior Chemist

8/10/12

Date



Michael Murphy  
Project Principal

8/10/12

Date

**References:**

American Public Health Association (APHA), 1995. "Standard Methods for Examination of Water and Wastewater"; 19th Edition; APHA, 1015 Fifteenth St., NW. Washington, DC 20005.

MACTEC, 2007. "Final Interim Response Steps Work Plan"; Olin Chemical Superfund Site; 51 Eames Street, Wilmington, Massachusetts; August 8, 2007.

Massachusetts Department of Environmental Protection (MassDEP), 2010. "The Compendium of Quality Assurance and Quality Control Requirements and Performance Standards for Selected Analytical Methods Used in Support of Response Actions for the Massachusetts Contingency Plan (MCP)"; Bureau of Waste Site Cleanup; 1 Winter Street, Boston, Massachusetts 02108; WSC-CAM; July 2010.

U.S. Environmental Protection Agency (USEPA), 1993. "Methods for Chemical Analysis and Water and Wastes (MCAWW)", EPA/600/4-79-020 (March 1983) with updates and supplements EPA/600/4-91-010 (June 1991), EPA/600/R-92-129 (August 1992) and EPA/600/R-93-100 (August 1993).

U.S. Environmental Protection Agency (USEPA), 1996. "Test Methods for Evaluating Solid Waste"; Laboratory Manual Physical/Chemical Methods; Office of Solid Waste and Emergency Response; Washington, DC; SW-846; November 1986; Revision 4 - December 1996.

**Table 1**  
**Sample Summary**  
**Data Validation Report**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

Lab Sample ID	Location	Sample ID	Sample Date	SW846 6010B	SW846 6010B	E350.1	A2510B	40CFR136A
				Total Metals	Filtered Metals	(QuickChem 10-107-06-1-B) Ammonia		300.0 Anions
Groundwater								
360-40743-1	GW-202S	OC-GW-202S	5/23/2012		2	1	1	2
360-40743-2	GW-202D	OC-GW-202D	5/23/2012		2	1	1	2
360-40743-3	GW-78S	OC-GW-78S	5/24/2012		2	1	1	2
360-40743-4	GW-79S	OC-GW-79S	5/24/2012		2	1	1	2
360-40743-5	PZ-16RR	OC-PZ-16RR	5/24/2012		2	1	1	2
360-40743-6	PZ-17RR	OC-PZ-17RR	5/24/2012		2	1	1	2
360-40743-7	PZ-18R	OC-PZ-18R	5/24/2012		2	1	1	2
360-40743-8	PZ-24	OC-PZ-24	5/24/2012		2	1	1	2
360-40743-9	PZ-25	OC-PZ-25	5/23/2012		2	1	1	2
360-40743-10	GW-202D	OC-GW-202D DUP	5/23/2012		2	1	1	2
360-40846-1	GW-202D	OC-GW-10S	5/30/2012		2	1	1	2
360-40846-2	GW-202D	OC-GW-201S	5/29/2012		2	1	1	2
360-40846-3	GW-202D	OC-GW-26	5/30/2012		2	1	1	2
360-40846-4	GW-202D	OC-GW-34D	5/29/2012		2	1	1	2
360-40846-5	GW-202D	OC-GW-34SR	5/29/2012		2	1	1	2
360-40846-6	GW-202D	OC-GW-35S	5/29/2012		2	1	1	2
360-40846-7	GW-202D	OC-GW-42S	5/31/2012		2	1	1	2
360-40846-8	GW-202D	OC-GW-43SR	5/31/2012		2	1	1	2
360-40846-9	GW-202D	OC-GW-76S	5/30/2012		2	1	1	2
360-40846-10	GW-202D	OC-GW-CA1	5/29/2012		2	1	1	2
360-40846-11	GW-202D	OC-GW-DUP-10S	5/30/2012		2	1	1	2
360-40991-1	GW-202D	OC-GW-25	6/1/2012		2	1	1	2
360-40991-2	GW-202D	OC-GW-24	6/1/2012		2	1	1	2
Surface Water								
360-40979-1	ISCO1	OC-SW-ISCO1	6/7/2012	3	3	1	1	4
360-40979-2	ISCO2	OC-SW-ISCO2	6/7/2012	3	3	1	1	4
360-40979-3	ISCO3	OC-SW-ISCO3	6/7/2012	3	3	1	1	4
360-40979-4	PZ-16RR	OC-SW-PZ-16RRSW	6/7/2012	3	3	1	1	4
360-40979-5	PZ-17RR	OC-SW-PZ-17RRSW	6/7/2012	3	3	1	1	4
360-40979-6	PZ-18R	OC-SW-PZ-18RSW	6/7/2012	3	3	1	1	4
360-40979-7	SD-17	OC-SW-SD-17	6/7/2012	3	3	1	1	4
360-40979-8	PZ-18R	OC-SW-PZ-18RSW DUP	6/7/2012	3	3	1	1	4

**Notes:**

Number listed under method indicates number of target analytes reported.

Prepared by / Date: KJC 06/26/12

Checked by / Date: MJW 07/16/12

**Table 2**  
**Final Results Summary**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		GW-10S		GW-10S		GW-201S		GW-202D		GW-202D		GW-202S		GW-24	
				Field Sample ID		OC-GW-10S		OC-GW-DUP-10S		OC-GW-201S		OC-GW-202D		OC-GW-202D DUP		OC-GW-202S		OC-GW-24	
				Field Sample Date		05/30/12		05/30/12		05/29/12		05/23/12		05/23/12		05/23/12		06/01/12	
				QC Code		FS		FD		FS		FS		FD		FS		FS	
				Lab Sample Delivery Group		360-40846-1		360-40846-1		360-40846-1		360-40743-1		360-40743-1		360-40743-1		360-40991-1	
Frac	Method	Analyte	Units	Result		Qual		Result		Qual		Result		Qual		Result		Qual	
F	SW6010	Aluminum	ug/l	2500				2600		100 U		13000		12000		100 U		100 U	
F	SW6010	Chromium	ug/l	5 U				5 U		18		1100		1100		4.2 J		5 U	
N	E300	Chloride	mg/l	4.6				4.4		60		260		260		46		9.4	
N	E300	Sulfate	mg/l	32				32		1300		1700		1800		300		45	
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/l	0.72				0.65		160		250		230		54		33	
N	A2510B	LAB SPECIFIC CONDUCTANCE	umhos/cm	96				95		3000		4000		4000		1000		320	

Notes:

N = normal

F = filtered

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

ug/l = microgram per liter

mg/l = milligram per liter

umhos/cm = micromhos per centimeter

**Table 2**  
**Final Results Summary**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		GW-25		GW-26		GW-34D		GW-34SR		GW-35S		GW-42S		GW-43SR	
				Field Sample ID		OC-GW-25		OC-GW-26		OC-GW-34D		OC-GW-34SR		OC-GW-35S		OC-GW-42S		OC-GW-43SR	
				Field Sample Date		06/01/12		05/30/12		05/29/12		05/29/12		05/29/12		05/31/12		05/31/12	
				QC Code		FS		FS		FS		FS		FS		FS		FS	
				Lab Sample Delivery Group		360-40991-1		360-40846-1		360-40846-1		360-40846-1		360-40846-1		360-40846-1		360-40846-1	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
F	SW6010	Aluminum	ug/l	100	U	100	U	500	U	100	U	26	J	700		20	J		
F	SW6010	Chromium	ug/l	3.3	J	7.3		17	J	1.3	J	17		37		5	U		
N	E300	Chloride	mg/l	91		300		11		1.3		6.8		72		140			
N	E300	Sulfate	mg/l	98		46		38		8.2		280		13		27			
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/l	46		35		15		0.1	U	40		2.2		1.3			
N	A2510B	LAB SPECIFIC CONDUCTANCE	umhos/cm	740		1100		200		69		1100		360		580			

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umhos/cm = micromhos per centimeter

**Table 2**  
**Final Results Summary**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		GW-76S		GW-78S		GW-79S		GW-CA1		PZ-16RR		PZ-17RR		PZ-18R	
				Field Sample ID		OC-GW-76S		OC-GW-78S		OC-GW-79S		OC-GW-CA1		OC-PZ-16RR		OC-PZ-17RR		OC-PZ-18R	
				Field Sample Date		05/30/12		05/24/12		05/24/12		05/29/12		05/24/12		05/24/12		05/24/12	
				QC Code		FS		FS		FS		FS		FS		FS		FS	
				Lab Sample Delivery Group		360-40846-1		360-40743-1		360-40743-1		360-40846-1		360-40743-1		360-40743-1		360-40743-1	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
F	SW6010	Aluminum	ug/l	55	J	100	U	100	U	100	U	100	U	100	U	200		100	U
F	SW6010	Chromium	ug/l	4.3	J	2.6	J	5.4		1.9	J	5.1		160		9.9			
N	E300	Chloride	mg/l	5.2		26		210		2.1		150		89		190			
N	E300	Sulfate	mg/l	63		490		1500		40		880		360		200			
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/l	14		62		150		0.1	U	190		47		70			
N	A2510B	LAB SPECIFIC CONDUCTANCE	umhos/cm	220		1300		3100		440		2700		1300		1300			

Notes:

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F = filtered

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FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

ug/l = microgram per liter

mg/l = milligram per liter

umhos/cm = micromhos per centimeter



**Table 2**  
**Final Results Summary**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name	PZ-24		PZ-25	
				Field Sample ID	OC-PZ-24		OC-PZ-25	
				Field Sample Date	05/24/12		05/23/12	
				QC Code	FS		FS	
				Lab Sample Delivery Group	360-40743-1		360-40743-1	
Frac	Method	Analyte	Units	Result	Qual	Result	Qual	
F	SW6010	Aluminum	ug/l	100	U	100	U	
F	SW6010	Chromium	ug/l	23		9.7		
N	E300	Chloride	mg/l	26		19		
N	E300	Sulfate	mg/l	960		510		
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/l	68		43		
N	A2510B	LAB SPECIFIC CONDUCTANCE	umhos/cm	1900		1400		

Notes:

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F = filtered

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FD = field duplicate

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J = value is estimated

ug/l = microgram per liter

mg/l = milligram per liter

umhos/cm = micromhos per centimeter

Prepared by / Date: KJC 07/19/12

Checked by / Date: MJW 07/20/12

**Table 2**  
**Final Results Summary**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name		ISCO1		ISCO2		ISCO3		PZ-16RR		PZ-17RR		PZ-18R	
				Field Sample ID		OC-SW-ISCO1		OC-SW-ISCO2		OC-SW-ISCO3		OC-SW-PZ-16RRSW		OC-SW-PZ-17RRSW		OC-SW-PZ-18RSW	
				Field Sample Date		06/07/12		06/07/12		06/07/12		06/07/12		06/07/12		06/07/12	
				QC Code		FS		FS		FS		FS		FS		FS	
				Lab Sample Delivery Group		360-40979-1		360-40979-1		360-40979-1		360-40979-1		360-40979-1		360-40979-1	
Frac	Method	Analyte	Units	Result		Qual		Result		Qual		Result		Qual		Result	
T	SW6010	Aluminum	ug/l	88	J			800				28	J			310	
T	SW6010	Chromium	ug/l	9.6				170				5	U			140	J
T	SW6010	Sodium	ug/l	58000	J			84000	J			71000	J			88000	J
F	SW6010	Aluminum	ug/l	100				120				25	J			360	
F	SW6010	Chromium	ug/l	11				37				5	U			160	J
F	SW6010	Sodium	ug/l	64000				83000				71000				95000	
N	E300	Chloride	mg/l	100				100				160				120	
N	A2510B	LAB SPECIFIC CONDUCTANCE	umhos/cm	640				1000				680				1100	
N	E300	Nitrate as N	mg/l	0.27				0.55				0.71				0.44	
N	E300	Nitrite as N	mg/l	0.1	U			0.1	U			0.1	U			0.1	U
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/l	23				46				1.8				48	
N	E300	Sulfate	mg/l	98				250				34				270	

Notes:

N = normal

T = total (unfiltered)

F = filtered

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

ug/l = microgram per liter

mg/l = milligram per liter

umhos/cm = micromhos per centimeter

**Table 2**  
**Final Results Summary**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

				Loc Name	PZ-18R		SD-17		
				Field Sample ID	OC-SW-PZ-18RSW DUP		OC-SW-SD-17		
				Field Sample Date	06/07/12		06/07/12		
				QC Code	FD		FS		
				Lab Sample Delivery Group	360-40979-1		360-40979-1		
Frac	Method	Analyte	Units	Result		Qual	Result		Qual
T	SW6010	Aluminum	ug/l	140			2900		
T	SW6010	Chromium	ug/l	15			680		
T	SW6010	Sodium	ug/l	64000 J			110000 J		
F	SW6010	Aluminum	ug/l	150			2900		
F	SW6010	Chromium	ug/l	15			660		
F	SW6010	Sodium	ug/l	64000			99000		
N	E300	Chloride	mg/l	110			130		
N	A2510B	LAB SPECIFIC CONDUCTANCE	umhos/cm	640			1100		
N	E300	Nitrate as N	mg/l	0.27			0.44		
N	E300	Nitrite as N	mg/l	0.1 U			0.1 U		
N	LACH_107_06_1_B	Nitrogen, as Ammonia	mg/l	23			60		
N	E300	Sulfate	mg/l	98			280		

Notes:

N = normal

T = total (unfiltered)

F = filtered

FS = field sample

FD = field duplicate

U = not detected, value is the detection limit

J = value is estimated

ug/l = microgram per liter

mg/l = milligram per liter

umhos/cm = micromhos per centimeter

Prepared by / Date: KJC 07/19/12

Checked by / Date: MJW 07/20/12

**Table 3**  
**Validation Qualification Action Summary**  
**Data Validation Report**  
**May/June 2012 Slurry Wall / Cap Groundwater and Surface Water**  
**Olin Chemical Superfund Site**  
**Wilmington, Massachusetts**

SDG	Lab Sample ID	Analytical Method	Fraction	Field Sample ID	Parameter	Lab Result	Lab Qualifier	Final Result	Final Qualifier	Val Reason Code	Units
360-40979-1	360-40979-1	SW6010	T	OC-SW-ISCO1	Sodium	58000		58000	J	MS-L	ug/l
360-40979-1	360-40979-2	SW6010	T	OC-SW-ISCO2	Sodium	84000		84000	J	MS-L	ug/l
360-40979-1	360-40979-3	SW6010	T	OC-SW-ISCO3	Sodium	71000		71000	J	MS-L	ug/l
360-40979-1	360-40979-4	SW6010	T	OC-SW-PZ-16RRSW	Chromium	140		140	J	TD	ug/l
360-40979-1	360-40979-4	SW6010	T	OC-SW-PZ-16RRSW	Sodium	88000		88000	J	MS-L	ug/l
360-40979-1	360-40979-5	SW6010	T	OC-SW-PZ-17RRSW	Sodium	110000		110000	J	MS-L	ug/l
360-40979-1	360-40979-6	SW6010	T	OC-SW-PZ-18RSW	Sodium	65000		65000	J	MS-L	ug/l
360-40979-1	360-40979-7	SW6010	T	OC-SW-SD-17	Sodium	110000		110000	J	MS-L	ug/l
360-40979-1	360-40979-8	SW6010	T	OC-SW-PZ-18RSW DUP	Sodium	64000		64000	J	MS-L	ug/l
360-40979-2	360-40979-4	SW6010	F	OC-SW-PZ-16RRSW	Chromium	160		160	J	TD	ug/l

Units:

ug/l = microgram per liter

Validation Qualifier:

J = Value is estimated

Prepared by / Date:

KJC 07/19/12

Checked by / Date:

MJW 07/20/12

Fraction

T = Total

F = Filtered

Validation Reason Codes:

MS-L = MS and/or MSD recovery low

TD = Dissolved concentration exceeds total concentration by greater than ten percent

**Data Validation Checklists**

**And**

**Data Validation Summaries**

**OLIN-WILMINGTON**  
**LEVEL I DATA QUALITY EVALUATION**  
**STANDARD OPERATING PROCEDURE AND CHECKLIST**  
**ICP METALS BY METHOD 6010B/200.7**

Reviewer/Date Mike Washburn  
 Sr. Review/Date Chy Ricard 8/7/12  
 Lab Report # 360-40991, 360-40996, 360-40979  
 Project # 6107120016-10  
360-40743

## 1.0 Laboratory Deliverable Requirements

**1.1 Laboratory Information:** Was all of the following provided in the laboratory report? Yes ☒ No ☐ N/A ☐ Comments:  
 Check items received.

☒ Name of Laboratory    ☒ Address    ☒ Project ID    ☒ Phone #    ☒ Sample identification – Field and Laboratory  
Client Information:    ☒ Name    ☒ Address    ☒ Client Contact    (IDs must be cross-referenced)

**ACTION:** If no, contact lab for submission of missing or illegible information.

## 1.2 Laboratory Report Certification Statement

Yes ☒ No ☐ N/A ☐ Comments:

Does the laboratory report include a completed Analytical Report Certification in the required format?

**ACTION:** If no, contact lab for submission of missing certification or certification with correct format.

## 1.3 Laboratory Case Narrative:

Yes ☒ No ☐ N/A ☐ Comments:

☒ Narrative serves as an exception report for the project and method QA/QC performance.    ☒ Narrative includes an explanation of each discrepancy on the

Certification Statement.

**ACTION:** If no, contact lab for submission of missing or illegible information.

## 1.4 Chain of Custody (COC) copy present with all documentation completed

Yes ☒ No ☐ N/A ☐ Comments:

**NOTE:** Olin receives and maintains the *original* COC.

**ACTION:** If no, contact lab for submission of copy of completed COC.

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**1.5 Sample Receipt Information (*Cooler Receipt Form present?*):**

Yes ☒ No ☐ N/A ☐ Comments:

Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?

- ☒ Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply).  
☒ Container type noted ☒ sample condition observed ☒ pH verified (where applicable) ☒ Field and lab IDs cross referenced

**ACTION:** If no, contact lab for submission of missing or incomplete documentation.

**1.5.1** Were all samples delivered to the laboratory without breakage?

Yes ☒ No ☐ N/A ☐ Comments:

**1.5.2** Does the *Cooler Receipt Form* or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?

Yes ☐ No ☒ N/A ☐ Comments:

**1.6 Sample Results Section:** Was each of the following requirements supplied in the laboratory report for each sample?

Yes ☒ No ☐ N/A ☐ Comments:

- |   |  |  |  |   |  |
|---|--|--|--|---|--|
| <input checked="" type="checkbox"/> Field ID and Lab ID | <input checked="" type="checkbox"/> Date and time collected            | <input checked="" type="checkbox"/> Analyst Initials                             | <input checked="" type="checkbox"/> Dilution Factor                          | <input checked="" type="checkbox"/> % moisture or solids                    | <input checked="" type="checkbox"/> Reporting limits |
| <input checked="" type="checkbox"/> Clean-up method     | <input checked="" type="checkbox"/> Analysis method                    | <input checked="" type="checkbox"/> Preparation method                           | <input checked="" type="checkbox"/> Date of preparation/extraction/digestion | <input checked="" type="checkbox"/> clean-up and analysis, where applicable |  |
| <input checked="" type="checkbox"/> Matrix              | <input checked="" type="checkbox"/> Target analytes and concentrations | <input checked="" type="checkbox"/> Units (soils must be reported in dry weight) |  |   |  |

**ACTION:** If no, contact lab for submission of missing or incomplete information.

**1.7 QA/QC Information:** Was each of the following information supplied in the laboratory report for each sample batch?

Yes ☒ No ☐ N/A ☐ Comments:

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☒ Method blank results   ☒ LCS recoveries   ☒ MS/MSD recoveries and RPDs   ☒ Laboratory duplicate results (where applicable)

**ACTION:** If no, contact lab for submission of missing or incomplete information.

**2.0   Holding Times**

Have any technical holding times, determined from date of collection to date of analysis, been exceeded? Holding time for metals is 180 days from sample collection to analysis for both water and soil.   Yes ☐   No ☒   N/A ☐   Comments:

**NOTE:** List samples that exceed hold time with # of days exceeded on checklist

**ACTION:** If technical holding times are exceeded, qualify all positive results (J) and non-detects (UJ). If grossly exceeded (2X holding time) reject (R) all non-detect results.

**3.0   Laboratory Method**

**3.1**   Was the correct laboratory method used?   Yes ☒   No ☐   N/A ☐   Comments:

Water Digestion	3005A or 3010A or 3020A
Soil Digestion	3050B
Metals	6010B or 200.7

**ACTION:** If no, contact laboratory to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change and to request variance.

**3.2**   Are the practical quantitation limits the same as those specified by the   Yes ☒   No ☐   N/A ☐   Comments:  
☐ SOW   ☒ QAPP   ☐ Lab   ☐ MADEP

**NOTE:** Verify that the reported metals match the target list specified on the COC.



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**ACTION:** If no, evaluate variation with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

3.3 Are results present for each sample in the SDG?

Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data

3.4 If dilutions were required, were dilution factors reported?

Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact the lab for submission.

#### 4.0 Method Blanks

4.1 Is the Method Blank Summary present?

Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, call the laboratory for submission of missing data.

4.2 Frequency of Analysis: Was a method blank analyzed for each digestion batch of < 20 field samples? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact laboratory for justification. Consult senior chemist for action needed. Narrate non-compliance.

4.3 Is the method blank less than the PQLs for all target elements?

Yes ☒ No ☐ N/A ☐ Comments:

**NOTE:** MADEP requires the method blank to be matrix matched and digested with the samples

4.4 Do any method blanks have positive results for metals? Qualify data according to the following:

Yes ☐ No ☒ N/A ☐ Comments:

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If the sample concentration is  $< 5 \times$  blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is  $> 5 \times$  blank value, no qualification is needed.

**ACTION:** For any blank with positive results, list all contaminants for each method blank including the concentration detected and the flagging level (flagging level =  $5 \times$  the blank value) and the associated samples and qualifiers.

**5.0    Laboratory Control Standard**

**5.1**    Was a laboratory control standard run with each analytical batch of 20 samples or less?    Yes ☒    No ☐    N/A ☐    Comments:

**NOTE:** A full target, second source LCS is required by MADEP.

**ACTION:** Call laboratory for LCS form submittal. If data are not available, use professional judgement to evaluate data accuracy associated with that batch.

**5.2**    Is a LCS Summary Form present?    Yes ☒    No ☐    N/A ☐    Comments:

**ACTION:** If no, contact lab for resubmission of missing data.

**5.3**    Is the recovery of any analyte outside of MADEP control limits?    Yes ☐    No ☒    N/A ☐    Comments:

<u>Sample Type</u>	<u>MADEP % Rec</u>
Water	80-120
Soil	within Lab generated limits

**ACTION:** If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive and non-detects results within the batch as (J). If LCS recovery is  $< 30\%$ , positive and non-detect results are rejected (R).

Comments:

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**6.0 Matrix Spikes**

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

OC-GW-202D  
OC-GW-10S  
OC-SW-PZ-18R5W

**6.1** Were project-specific MS/MSDs collected? List project samples that were spiked. Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact senior chemist to see if any were specified.

**6.2** Is the Matrix Spike/Matrix Spike Duplicate Recovery Form present? Yes ☒ No ☐ N/A ☐ Comments:

**NOTE:** A full target, second source MS/MSD is required by MADEP.

**ACTION:** If any matrix spike data are missing, call lab for resubmission.

**6.3** Were matrix spikes analyzed as indicated on the COC and project schedule? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If any matrix spike data are missing, call lab for resubmission. If none, no qualification is needed. Narrate non-compliance.

**6.4** Are any metal spike recoveries outside of the QC limits? Yes ☒ No ☐ N/A ☐ Comments:

Sample Type	MADEP % Rec	QAPP % Rec	Method
Water	75-125	N/A	6010B
Water	N/A	70-130	200.7
Soil	75-125	75-125	6010B

Sodium - MS  
68 } OC-SW-PZ-18R5W

**NOTE:**  $\%R = \frac{(SSR-SR)}{SA} \times 100\%$  Where: SSR = Spiked sample result  
SR = Sample result  
SA = Spike added

**NOTE:** If dilutions are required due to high sample concentrations (> 4X spike), the data are evaluated, but no flags are applied.

# QC Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

## Method: 6010C - Metals (ICP)

Lab Sample ID: MB 360-91679/1-A  
Matrix: Water  
Analysis Batch: 91904

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 91679

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		100	13	ug/L		06/08/12 09:10	06/13/12 14:31	1
Chromium	ND		5.0	0.53	ug/L		06/08/12 09:10	06/13/12 14:31	1
Sodium	ND		2000	700	ug/L		06/08/12 09:10	06/13/12 14:31	1

Lab Sample ID: LCS 360-91679/2-A  
Matrix: Water  
Analysis Batch: 91904

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 91679

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	5000	5180		ug/L		104	80 - 120
Chromium	1000	1030		ug/L		103	80 - 120
Sodium	20000	19700		ug/L		99	80 - 120

Lab Sample ID: LCSD 360-91679/3-A  
Matrix: Water  
Analysis Batch: 91904

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA  
Prep Batch: 91679

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	5000	5050		ug/L		101	80 - 120	2	20
Chromium	1000	1000		ug/L		100	80 - 120	3	20
Sodium	20000	19100		ug/L		96	80 - 120	3	20

Lab Sample ID: 360-40979-6 MS  
Matrix: Water  
Analysis Batch: 91904

Client Sample ID: OC-SW-PZ-18RSW  
Prep Type: Total/NA  
Prep Batch: 91679

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	170		5000	4850		ug/L		93	75 - 125
Chromium	18		1000	942		ug/L		92	75 - 125
Sodium	65000		20000	78800	F	ug/L		68	75 - 125

Lab Sample ID: 360-40979-6 MSD  
Matrix: Water  
Analysis Batch: 91904

Client Sample ID: OC-SW-PZ-18RSW  
Prep Type: Total/NA  
Prep Batch: 91679

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	170		5000	4890		ug/L		94	75 - 125	1	20
Chromium	18		1000	960		ug/L		94	75 - 125	2	20
Sodium	65000		20000	82700		ug/L		87	75 - 125	5	20

Lab Sample ID: MB 360-91957/1-A  
Matrix: Water  
Analysis Batch: 92012

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 91957

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		100	13	ug/L		06/15/12 10:16	06/15/12 18:31	1
Chromium	ND		5.0	0.53	ug/L		06/15/12 10:16	06/15/12 18:31	1
Sodium	ND		2000	700	ug/L		06/15/12 10:16	06/15/12 18:31	1

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2/12/12*

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**NOTE:** If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags.

**ACTION:** MS/MSD flags only apply to the sample spiked. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit, qualify positive results and non-detects (J).

**6.5** Are any RPDs for MS/MSD recoveries outside of the QC limits?

Yes ☐ No ☒ N/A ☐ Comments:

**NOTE:**  $RPD = \frac{S-D}{(S+D)/2} \times 100\%$  Where: S = MS sample result  
D = MSD sample result

**NOTE:** If dilutions are required due to high sample concentrations, the data are evaluated, but no flags are applied.

**ACTION:** If the RPD exceeds the control limit, qualify positive results and non-detects (J).

**7.0 Laboratory Duplicate**

**7.1** Was a laboratory duplicate sample analyzed? If so, is the Laboratory Duplicate Sample Form present? Yes ☐ No ☒ N/A ☐ Comments:

**NOTE:** MADEP refers to this sample as a "matrix duplicate".

**ACTION:** If not analyzed, qualification is not needed. If data is missing, contact laboratory for resubmission of report. Narrate non-compliance.

**7.2** Is the RPD between the result for the laboratory duplicate sample and the result for the parent sample outside of the QA/QC limits?

Yes ☐ No ☐ N/A ☒ Comments:

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<u>MADEP Laboratory Duplicate Sample RPD Criteria:</u>	<u>QAPP RPD</u>
For aqueous results > 5×RL, RPD must be ± 20%	20
For aqueous results < 5×RL, RPD must be ≤ RL	20
For soil/sediment results > 5×RL, RPD must be ± 35%	20
For soil/sediment results < 5×RL, RPD must be ≤ 2×RL	20

**ACTION:** If the RPD exceeds the limits, qualify both positive results and non-detects as estimated and flag them J. Narrate non-compliance

## 8.0 Sampling Accuracy

The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.

**8.1** Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist.

Yes ☐ No ☒ N/A ☐ Comments:

**8.2** Do any rinsate blanks have positive results?

Yes ☐ No ☐ N/A ☒ Comments:

**NOTE:** MADEP does not require the collection of rinsate blanks.

**ACTION:** Evaluate rinsate results against blank results to determine if contaminant may be laboratory-derived. If results are not lab-related, qualify according to below.

If the sample concentration is < 5 × blank value, flag sample result non-detect “U” at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is > 5 × blank value, no qualification is needed.

## 9.0 Field Duplicates

**9.1** Were field duplicate samples collected? Obtain a list of samples and their associated field duplicates.

Yes ☒ No ☐ N/A ☐ Comments:

### Field Duplicate

lab_sample_id	field_sample_id	qc_code	param_name	final_result	Average	Difference	RPD
360-40743-10	OC-GW-202D DUP	FD	Aluminum	12000	12500	1000	8%
360-40743-2	OC-GW-202D	FS	Aluminum	13000			
360-40743-10	OC-GW-202D DUP	FD	Chromium	1100	1100	0	0%
360-40743-2	OC-GW-202D	FS	Chromium	1100			

# Field Duplicate

fraction	lab_sample_id	field_sample_id	qc_code	param_name	final_result	Average	Difference	RPD
T	360-40979-6	OC-SW-PZ-18RSW	FS	Aluminum	170	155	30	19%
T	360-40979-8	OC-SW-PZ-18RSW	FD	Aluminum	140			
T	360-40979-6	OC-SW-PZ-18RSW	FS	Chromium	18	16.5	3	18%
T	360-40979-8	OC-SW-PZ-18RSW	FD	Chromium	15			
T	360-40979-6	OC-SW-PZ-18RSW	FS	Sodium	65000	64500	1000	2%
T	360-40979-8	OC-SW-PZ-18RSW	FD	Sodium	64000			
D	360-40979-6	OC-SW-PZ-18RSW	FS	Aluminum	160	155	10	6%
D	360-40979-8	OC-SW-PZ-18RSW	FD	Aluminum	150			
D	360-40979-6	OC-SW-PZ-18RSW	FS	Chromium	15	15	0	0%
D	360-40979-8	OC-SW-PZ-18RSW	FD	Chromium	15			
D	360-40979-6	OC-SW-PZ-18RSW	FS	Sodium	63000	63500	1000	2%
D	360-40979-8	OC-SW-PZ-18RSW	FD	Sodium	64000			



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9.2 Were field duplicates collected per the required frequency?

Yes ☒ No ☐ N/A ☐ Comments:

SOW ☒ QAPP (1 per 10) ☐ MADEP Option 1 (1 per 20) ☐ MADEP Option 3 (1 per 10) ☐

9.3 Was the RPD  $\leq 50\%$  for soils or waters? Calculate the RPD for all results and attach to this review. Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** RPD must be  $\leq 50\%$  for soil and water. Qualify data (J) for both sample results if the RPD exceeds 50%.

**10.0 Special QA/QC**

10.1 Were both total and dissolved metals analysis performed? If so, the dissolved metal concentration should not exceed that of the total metal. Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If results for both total and dissolved are  $\geq 5x$  the PQL **and** the dissolved concentration is 10% higher than the total, flag both results as estimated (J). If total and dissolved concentrations are less than 5x the PQL **and** the **difference** exceeds 2x the PQL, flag both results as estimated (J)

Cr SW-16 J

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**10.0    Application of Validation Qualifiers**

Was any of the data qualified?

Yes ☒    No ☐    N/A ☐    Comments:

If so, apply data qualifiers directly to the DQE copy of laboratory report and **flag pages** for entry in database.

**REFERENCES**

- LAW, 1999, "Final Quality Assurance Project Plan, Olin Wilmington Property, 51 Eames Street, Wilmington, MA", LAW Engineering and Environmental Services, Kennesaw, GA 30144. August 1999
- U.S. Environmental Protection Agency (USEPA), 1989. "Region 1 Laboratory Data Validation Functional Guidelines For Evaluating Inorganic Analyses"; Hazardous Site Evaluation Division; February 1989.
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 1 July 2010.
- MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1 July 2010.
- MADEP, 2010. "Quality Control Requirements and Performance Standards for the Analysis of Trace Metals by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES) in Support of Response Actions under the Massachusetts Contingency Plan (MCP)" WSC-CAM, Final, Revision No. 1, 5 July 2010.

## Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-2

Client Sample ID: OC-SW-PZ-16RRSW

Lab Sample ID: 360-40979-4

Date Collected: 06/07/12 09:05

Matrix: Water

Date Received: 06/07/12 16:40

### Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	360		100	13	ug/L		06/27/12 08:57	06/28/12 15:11	1
Chromium	160	J	5.0	0.66	ug/L		06/27/12 08:57	06/28/12 15:11	1
Sodium	95000		2000	780	ug/L		06/27/12 08:57	06/28/12 15:11	1

mjlw  
7/3/12

# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-ISC01

Lab Sample ID: 360-40979-1

Date Collected: 06/07/12 10:30

Matrix: Water

Date Received: 06/07/12 16:40

## Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	88	J	100	13	ug/L		06/08/12 09:10	06/13/12 15:53	1
Chromium	9.6		5.0	0.53	ug/L		06/08/12 09:10	06/13/12 15:53	1
Sodium	58000	J	2000	700	ug/L		06/08/12 09:10	06/13/12 15:53	1

## Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	97	J	100	13	ug/L			06/18/12 15:19	1
Chromium	12		5.0	0.53	ug/L			06/18/12 15:19	1
Sodium	72000	J	2000	700	ug/L			06/18/12 15:19	1

## General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.27		0.050	0.050	mg/L			06/08/12 13:52	1
Sulfate	98		2.0	2.0	mg/L			06/08/12 13:52	1
Chloride	100		10	10	mg/L			06/08/12 14:09	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 14:09	10
Ammonia	23		0.50	0.50	mg/L		06/11/12 10:06	06/11/12 12:58	5
Specific Conductance	640		1.0	1.0	umhos/cm			06/11/12 10:23	1

MJW  
6/21/12

# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-ISCO2

Lab Sample ID: 360-40979-2

Date Collected: 06/07/12 08:45

Matrix: Water

Date Received: 06/07/12 16:40

Method: 6010C - Metals (ICP)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	800		100	13	ug/L		06/08/12 09:10	06/13/12 16:02	1
Chromium	170		5.0	0.53	ug/L		06/08/12 09:10	06/13/12 16:02	1
Sodium	84000	J	2000	700	ug/L		06/08/12 09:10	06/13/12 16:02	1

Method: 6010C - Metals (ICP) - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	130		100	13	ug/L			06/18/12 15:22	1
Chromium	42		5.0	0.53	ug/L			06/18/12 15:22	1
Sodium	95000		2000	700	ug/L			06/18/12 15:22	1

General Chemistry									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.55		0.050	0.050	mg/L			06/08/12 14:26	1
Sulfate	250		20	20	mg/L			06/08/12 14:43	10
Chloride	100		10	10	mg/L			06/08/12 14:43	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 14:43	10
Ammonia	46		0.50	0.50	mg/L		06/11/12 10:06	06/11/12 12:59	5
Specific Conductance	1000		1.0	1.0	umhos/cm			06/11/12 10:25	1

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*7/25/12*

# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-ISCO3

Lab Sample ID: 360-40979-3

Date Collected: 06/07/12 08:30

Matrix: Water

Date Received: 06/07/12 16:40

Method: 6010C - Metals (ICP)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	28	J	100	13	ug/L		06/15/12 10:16	06/15/12 19:36	1
Chromium	ND		5.0	0.53	ug/L		06/15/12 10:16	06/15/12 19:36	1
Sodium	71000	J	2000	700	ug/L		06/15/12 10:16	06/15/12 19:36	1

Method: 6010C - Metals (ICP) - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	21	J	100	13	ug/L			06/18/12 15:31	1
Chromium	ND		5.0	0.53	ug/L			06/18/12 15:31	1
Sodium	82000		2000	700	ug/L			06/18/12 15:31	1

General Chemistry									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.71		0.050	0.050	mg/L			06/08/12 15:00	1
Sulfate	34		2.0	2.0	mg/L			06/08/12 15:00	1
Chloride	160		10	10	mg/L			06/08/12 15:17	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 15:17	10
Ammonia	1.8		0.10	0.10	mg/L		06/13/12 13:49	06/14/12 13:16	1
Specific Conductance	680		1.0	1.0	umhos/cm			06/11/12 10:26	1

MJW  
6/21/12

# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-PZ-16RRSW

Lab Sample ID: 360-40979-4

Date Collected: 06/07/12 09:05

Matrix: Water

Date Received: 06/07/12 16:40

## Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	310		100	13	ug/L		06/15/12 10:16	06/15/12 19:39	1
Chromium	140	J	5.0	0.53	ug/L		06/15/12 10:16	06/15/12 19:39	1
Sodium	88000	J	2000	700	ug/L		06/15/12 10:16	06/15/12 19:39	1

## Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	360		100	13	ug/L			06/18/12 15:33	1
Chromium	170		5.0	0.53	ug/L			06/18/12 15:33	1
Sodium	100000		2000	700	ug/L			06/18/12 15:33	1

## General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.44		0.050	0.050	mg/L			06/08/12 16:09	1
Sulfate	270		20	20	mg/L			06/08/12 16:26	10
Chloride	120		10	10	mg/L			06/08/12 16:26	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 16:26	10
Ammonia	48		1.0	1.0	mg/L		06/13/12 13:49	06/14/12 13:34	10
Specific Conductance	1100		1.0	1.0	umhos/cm			06/11/12 10:28	1

*mj*  
*6/20/12*

# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-PZ-17RRSW

Lab Sample ID: 360-40979-5

Date Collected: 06/07/12 09:20

Matrix: Water

Date Received: 06/07/12 16:40

## Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	540		100	13	ug/L		06/15/12 10:16	06/15/12 19:42	1
Chromium	260		5.0	0.53	ug/L		06/15/12 10:16	06/15/12 19:42	1
Sodium	110000	J	2000	700	ug/L		06/15/12 10:16	06/15/12 19:42	1

## Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	570		100	13	ug/L			06/18/12 15:36	1
Chromium	290		5.0	0.53	ug/L			06/18/12 15:36	1
Sodium	110000		2000	700	ug/L			06/18/12 15:36	1

## General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.35		0.050	0.050	mg/L			06/08/12 16:43	1
Sulfate	280		20	20	mg/L			06/08/12 17:00	10
Chloride	130		10	10	mg/L			06/08/12 17:00	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 17:00	10
Ammonia	49		1.0	1.0	mg/L		06/13/12 13:49	06/14/12 13:35	10
Specific Conductance	1100		1.0	1.0	umhos/cm			06/11/12 10:29	1

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4/20/12



# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-PZ-18RSW

Lab Sample ID: 360-40979-6

Date Collected: 06/07/12 09:55

Matrix: Water

Date Received: 06/07/12 16:40

Method: 6010C - Metals (ICP)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	170		100	13	ug/L		06/08/12 09:10	06/13/12 14:40	1
Chromium	18		5.0	0.53	ug/L		06/08/12 09:10	06/13/12 14:40	1
Sodium	65000	J	2000	700	ug/L		06/08/12 09:10	06/13/12 14:40	1
Method: 6010C - Metals (ICP) - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	160		100	13	ug/L			06/18/12 15:07	1
Chromium	17		5.0	0.53	ug/L			06/18/12 15:07	1
Sodium	71000		2000	700	ug/L			06/18/12 15:07	1
General Chemistry									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.27		0.050	0.050	mg/L			06/08/12 12:43	1
Sulfate	97		2.0	2.0	mg/L			06/08/12 12:43	1
Chloride	110		10	10	mg/L			06/08/12 13:01	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 13:01	10
Ammonia	28		0.50	0.50	mg/L		06/13/12 13:49	06/14/12 13:32	5
Specific Conductance	640		1.0	1.0	umhos/cm			06/11/12 10:31	1

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2/20/12*

# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-SD-17

Lab Sample ID: 360-40979-7

Date Collected: 06/07/12 09:35

Matrix: Water

Date Received: 06/07/12 16:40

Method: 6010C - Metals (ICP)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	2900		100	13	ug/L		06/15/12 10:16	06/15/12 19:45	1
Chromium	680		5.0	0.53	ug/L		06/15/12 10:16	06/15/12 19:45	1
Sodium	110000	J	2000	700	ug/L		06/15/12 10:16	06/15/12 19:45	1

Method: 6010C - Metals (ICP) - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	3100		100	13	ug/L			06/18/12 15:39	1
Chromium	730		5.0	0.53	ug/L			06/18/12 15:39	1
Sodium	110000		2000	700	ug/L			06/18/12 15:39	1

General Chemistry									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.44		0.050	0.050	mg/L			06/08/12 17:17	1
Sulfate	280		20	20	mg/L			06/08/12 17:34	10
Chloride	130		10	10	mg/L			06/08/12 17:34	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 17:34	10
Ammonia	60		1.0	1.0	mg/L		06/13/12 13:49	06/14/12 13:36	10
Specific Conductance	1100		1.0	1.0	umhos/cm			06/11/12 10:34	1

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#120112*

# Client Sample Results

Client: Olin Corporation  
Project/Site: Olin Chemical

TestAmerica Job ID: 360-40979-1

Client Sample ID: OC-SW-PZ-18RSW DUP

Lab Sample ID: 360-40979-8

Date Collected: 06/07/12 09:55

Matrix: Water

Date Received: 06/07/12 16:40

Method: 6010C - Metals (ICP)									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	140		100	13	ug/L		06/15/12 10:16	06/15/12 19:48	1
Chromium	15		5.0	0.53	ug/L		06/15/12 10:16	06/15/12 19:48	1
Sodium	64000	J	2000	700	ug/L		06/15/12 10:16	06/15/12 19:48	1

Method: 6010C - Metals (ICP) - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	150		100	13	ug/L			06/18/12 15:42	1
Chromium	16		5.0	0.53	ug/L			06/18/12 15:42	1
Sodium	71000		2000	700	ug/L			06/18/12 15:42	1

General Chemistry									
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.27		0.050	0.050	mg/L			06/08/12 17:51	1
Sulfate	98		2.0	2.0	mg/L			06/08/12 17:51	1
Chloride	110		10	10	mg/L			06/08/12 18:08	10
Nitrite as N	ND		0.10	0.10	mg/L			06/08/12 18:08	10
Ammonia	23		1.0	1.0	mg/L		06/13/12 13:49	06/14/12 13:37	10
Specific Conductance	640		1.0	1.0	umhos/cm			06/11/12 10:35	1

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Reviewer/Date Mike Washburn 7/12/12  
 Sr. Review/Date Chr Picard 8/7/12  
 Lab Report # 360-40979 360-40991  
 Project # 3 571 6107120016-10  
360-40846, 360-40743

**Note:** The following analyses will be evaluated according to the "MADEP QA/QC Guidelines for **Sampling, Data Evaluation and Reporting Activities.**" MADEP, however, may not list QA/QC criteria for every chemical analysis. Where not defined by MADEP, criteria will default to values stipulated in the QAPP. Where the QAPP does not define criteria, QA/QC requirements will default to limits employed by the laboratory.

## 1.0 Laboratory Deliverable Requirements

**1.1 Laboratory Information:** Was all of the following provided in the laboratory report? Yes ☒ No ☐ N/A ☐ Comments:  
 Check items received.

☒ Name of Laboratory    ☒ Address    ☒ Project ID    ☒ Phone #    ☒ Sample identification – Field and Laboratory  
Client Information:    ☒ Name    ☒ Address    ☒ Client Contact    (IDs must be cross-referenced)

**ACTION:** If no, contact lab for submission of missing or illegible information.

## 1.2 Laboratory Report Certification Statement

Yes ☒ No ☐ N/A ☐ Comments:

Does the laboratory report include a completed Analytical Report Certification in the required format?

**ACTION:** If no, contact lab for submission of missing certification or certification with correct format.

## 1.3 Laboratory Case Narrative:

Yes ☒ No ☐ N/A ☐ Comments:

☒ Narrative serves as an exception report for the project and method QA/QC performance.    ☒ Narrative includes an explanation of each discrepancy on the Certification Statement.

**ACTION:** If no, contact lab for submission of missing or illegible information.

## 1.4 Chain of Custody (COC) copy present with all documentation completed?

Yes ☒ No ☐ N/A ☐ Comments:

Does the laboratory report include copies of Chain of Custody forms containing all samples in this SDG?

**NOTE:** Olin receives and maintains the *original* COC.

**ACTION:** If no, contact lab for submission of copy of missing completed COC.

**1.5 Sample Receipt Information (Cooler Receipt Form):** Were each of the following tasks completed and recorded upon receipt of the sample(s) into the laboratory?

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Yes ☒ No ☐ N/A ☐ Comments:

☒ Sample temperature confirmed: must be 1° – 10° C. (If samples were sent by courier and delivered on the same day as collection, temperature requirement does not apply).

☒ Container type noted ☒ Condition observed ☐ pH verified (where applicable) ☒ Field and lab IDs cross referenced

**ACTION:** If no, contact lab for submission of missing or incomplete documentation.

1.5.1 Were the correct bottles and preservatives used?

Yes ☒ No ☐ N/A ☐ Comments:

Ammonia, – 1 Liter polyethylene/H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Oil & Grease – 1 Liter glass/HCL or H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Alkalinity – 1 Liter polyethylene/cool to 4°C

Chemical Oxygen Demand – 50 mL polyethylene/H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Chloride, pH, sulfate, nitrate, nitrite - 50 mL polyethylene/cool to 4°C

Nitrate/nitrite - H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Organic Carbon – 500 mL amber glass bottle/HCl or H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Sulfide – 50 mL polyethylene/ZnAcetate + NaOH to pH>9, cool to 4°C

Phenolics - H<sub>2</sub>SO<sub>4</sub> to pH<2, cool to 4°C

Specific conductance, TDS, TSS – 100 mL polyethylene/cool to 4°C

**ACTION:** If no, inform senior chemist. Document justification for change in container/volume (if applicable), qualify positive and non-detect data (J) data if cooler temperature exceeds 10°C. Rejection of data requires professional judgment

1.5.2 Were all samples delivered to the laboratory without breakage?

Yes ☒ No ☐ N/A ☐ Comments:

1.5.3 Does the *Cooler Receipt Form* or Lab Narrative indicate other problems with sample receipt, condition of the samples, analytical problems or special circumstances affecting the quality of the data?

Yes ☐ No ☒ N/A ☐ Comments:



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**1.6 Sample Results Section:** Was the following information supplied in the laboratory report for each sample?

Yes ☒ No ☐ N/A ☐ Comments:

- ☒ Field ID and Lab ID ☒ Date and time collected ☒ Analyst Initials ☒ Dilution Factor ☒ % moisture or solids ☒ Reporting limits  
☒ Clean-up method ☒ Analysis method ☒ Preparation method ☒ Date of preparation/extraction/digestion clean-up and analysis, where applicable  
☒ Matrix ☒ Target analytes and concentrations ☒ Units (soils must be reported in dry weight)

**ACTION:** If no, contact lab for submission of missing or incomplete information.

**1.7 QA/QC Information:** Was the following information provided in the laboratory report for each sample batch? Yes ☒ No ☐ N/A ☐ Comments:

- ☒ Method blank results ☒ LCS recoveries ☒ MS/MSD recoveries and RPDs ☒ Laboratory duplicate results (where applicable)

**ACTION:** If no, contact lab for submission of missing or incomplete information.

**2.0 Holding Times**

Yes ☐ No ☒ N/A ☐ Comments:

Have any technical holding times, determined from date of collection to date of analysis, been exceeded? The holding times are as follows:

28 days = ammonia, chemical oxygen demand, chloride, organic carbon, oil & grease, specific conductance, total organic carbon and sulfate

Alkalinity = 14 days

Sulfide, TDS, TSS = 7 days

pH = analyze immediately

Nitrate nitrogen as N = 48 hrs

Nitrite nitrogen as N = 48 hrs

Nitrate + Nitrite as N = 28 days

**NOTE:** List samples that exceed hold time with # of days exceeded on checklist

**ACTION:** If technical holding times are exceeded qualify results (J). For water samples that are grossly exceeded (>2X hold time) reject (R) all non-detect results. Professional judgment used to qualify soils.

**3.0 Laboratory Method**

Yes ☒ No ☐ N/A ☐ Comments:

3.1 Was the correct laboratory method used?

**ACTION:** If no, contact lab to provide justification for method change compared to the requested method. Contact senior chemist to inform Client of change or to request variance.

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3.2 Are the practical quantitation limits the same as those specified by the Yes ☒ No ☐ N/A ☐ Comments:  
☐ QAPP/IRSWP ☐ Lab?

**Note:** The MADEP QA/QC Guidelines do not yet list PQLs for wet chemistry analyses, therefore all criteria will default to values stipulated in the QAPP\*. Where the QAPP does not define criteria, QA/QC requirements default to limits employed by the lab\*\*. Other criteria may also apply.

Ammonia\* ☒ = 0.1 mg/ L

Alkalinity\*\* ☐ = 1 mg/L

Bicarbonate Alkalinity\*\* ☐ = 1 mg/L

Carbonate Alkalinity\*\* ☐ = 1 mg/L

Nitrate Nitrogen as N\* ☒ = .05 mg/L

Nitrite Nitrogen as N\* ☒ = .01 mg/L

Chloride\* ☒ = 1 mg/L

Hardness \* ☐ = 2 mg/L

Spec. Cond.\*\* ☒ 3 umhos/cm

Total Organic Carbon\*\* ☐ = 1 mg/L

Oil & Grease\* ☐ = 5.5 mg/L

Sulfate (EPA 300.0)\* ☒ = 2 mg/L

COD:\* Low - 20 mg/L

COD\* High - 50 mg/L ☐

TDS\* ☐ = 10 mg/L

TSS\* ☐ = 5 mg/L

pH\* ☐ < 2 to > 12

Phenolic - 0.01 mg/L

Other parameter(list) \_\_\_\_\_ PQL = \_\_\_\_\_ ☐ Source of PQL = \_\_\_\_\_

Other parameter(list) \_\_\_\_\_ PQL = \_\_\_\_\_ ☐ Source of PQL = \_\_\_\_\_

**ACTION:** If no, evaluate change with respect to sample matrix, preparation, dilution, moisture, etc. If sample PQL is indeterminate, contact lab for explanation.

3.3 Are the appropriate parameter results present for each sample in the SDG? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, check Request for Analysis to verify if method was ordered and COC to verify that it was sent, and contact lab for resubmission of the missing data

3.4 If dilutions were required, were dilution factors reported? Yes ☒ No ☐ N/A ☐ Comments:

**ACTION:** If no, contact the lab for submission.

4.0 **Method Blanks** Yes ☒ No ☐ N/A ☐ Comments:

4.1 Are the Method Blank Summaries present?

**ACTION:** If no, call the laboratory for submission of missing data.

4.2 Was a method blank analyzed for each analysis batch of wet chemistry field samples of 20 or less? Yes ☒ No ☐ N/A ☐ Comments:

Nitrite high due to dilution and  
subst of samples. SDG 40797

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**ACTION:** If no, document discrepancy in case narrative and contact lab for justification. Consult senior chemist for action needed.

4.3 Is the method blank less than the PQL? (See Section 3.2 for PQLs).

Yes ☒

No ☐

N/A ☐

Comments:

4.4 Do any method blanks have positive results for wet chemistry parameters? Qualify data according to the following:

Yes ☐

No ☒

N/A ☐

Comments:

If the sample concentration is  $< 5 \times$  blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is  $> 5 \times$  blank value, no qualification is needed.

**ACTION:** If any blank has positive results, list all the concentrations detected and flagging level (flagging level =  $5 \times$  blank value) on the checklist. List all affected samples and their qualifiers.

**5.0 Laboratory Control Standards**

5.1 Was a laboratory control standard (LCS) run with each analytical batch of 20 samples or less?

Yes ☒

No ☐

N/A ☐

Comments:

**ACTION:** If no, call laboratory for LCS form submittal. If data is not available, use professional judgment to determine qualification actions for data associated with the batch.

5.2 Is a LCS Summary Form present?

Yes ☒

No ☐

N/A ☐

Comments:

**ACTION:** If no, contact lab for resubmission of missing data.

5.3 Is any wet chemistry analyte LCS recovery outside the control limits?

Yes ☐

No ☒

N/A ☐

Comments:



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**LCS Limits:**

Alkalinity** <input checked="" type="checkbox"/> = 80-120%	Bicarbonate Alkalinity** <input type="checkbox"/> = 80-120%	Carbonate Alkalinity** <input type="checkbox"/> = 80-120%	Specific Conductivity * <input checked="" type="checkbox"/> = 80-120%
Total Organic Carbon** <input type="checkbox"/> = 80-120%	TDS** <input type="checkbox"/> = 80-120%	Oil & Grease* <input type="checkbox"/> = 80-120%	Ammonia Nitrogen as N* <input checked="" type="checkbox"/> = 80-120%
COD Low* <input type="checkbox"/> = 80-120%	COD High* <input type="checkbox"/> = 80-120%	Nitrate Nitrogen as N** <input checked="" type="checkbox"/> = 80-120%	Nitrite Nitrogen as N** <input checked="" type="checkbox"/> = 80-120%
Hardness* <input type="checkbox"/> = 80-120%	Chloride* <input checked="" type="checkbox"/> = 80-120%	Sulfate (EPA 300.0)* <input checked="" type="checkbox"/> = 80-120%	pH* <input type="checkbox"/> = 98-102%      TSS* NA

Other parameter(list) \_\_\_\_\_ %R = \_\_\_\_\_ ☐ Rec Limits = \_\_\_\_\_

Other parameter(list) \_\_\_\_\_ %R = \_\_\_\_\_ ☐ Rec Limits = \_\_\_\_\_

(MADEP has not yet defined LCS recovery limits for wet chemistry analyses.)

**ACTION:** If recovery is above the upper limit, qualify all positive sample results within the batch as (J). If recovery is below the lower limit, qualify all positive and no-detect results within the batch as (J). If LCS recovery is <10%, non-detect results are rejected (R).

**6.0 Matrix Spikes**

Matrix spikes may be collected at different frequencies based on monthly, quarterly, or task specific schedules. Confirm spike requirements for each set with the senior chemist.

6.1 Were project-specific MS/MSDs analyzed? List project samples that were spiked.

**ACTION:** If no, contact senior chemist to see if any were specified.

6.2 Is the MS/MSD Recovery Form present?

**ACTION:** If no, contact lab for resubmission of missing data.

6.3 Were matrix spikes analyzed at the required frequency of 1 per 20 samples per matrix?

**ACTION:** If any matrix spike data is missing, call lab for resubmission.

Yes ☒ No ☐ N/A ☐ Comments:

Yes ☒ No ☐ N/A ☐ Comments:

Yes ☒ No ☐ N/A ☐ Comments:

Yes ☐ No ☒ N/A ☐ Comments:

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~~OC-P2~~  
 OC-SW-P2-18 RSW  
 OC-GW-10S  
 OC-GW-2020

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6.4 Are any wet chemistry analyte spike recoveries outside of the QC limits?

NOTE:  $\frac{\%R}{SA} = \frac{(SSR-SR)}{SA} \times 100\%$

SA = Spike added

Where: SSR = Spiked sample result  
SR = Sample result

**MS/MSD Recovery Limits:**

Alkalinity* = NA	Bicarbonate Alkalinity* = NA	Carbonate alkalinity* = NA	Ammonia* (LACHAT) <input checked="" type="checkbox"/> = 75-125%
Chloride*(SM 4500 Cl) <input checked="" type="checkbox"/> = 75-125%	Specific Conductivity * = NA	Total Organic Carbon* = NA	TDS** = NA
Oil & Grease* = NA	COD Low* <input type="checkbox"/> = 75-125%	COD High* <input type="checkbox"/> = 75-125%	Nitrate Nitrogen as N** <input checked="" type="checkbox"/> = 75-125%
Nitrite Nitrogen as N** <input checked="" type="checkbox"/> = 75-125%	Hardness* <input type="checkbox"/> = 75-125%	Sulfate (EPA 300.0)* <input checked="" type="checkbox"/> = 75-125%	pH* = NA      TSS* = NA

Other parameter(list) \_\_\_\_\_ % R = \_\_\_\_\_ ☐ Rec Limits = \_\_\_\_\_

\* = Laboratory Limits      \*\* = Olin QAPP Limits      (MADEP has not yet defined LCS recovery limits for wet chemistry analyses.)

**NOTES:** 1) If only one of the recoveries for an MS/MSD pair is outside of the control limits, no qualification is necessary. Use professional judgment for the MS/MSD flags.  
2) If the MS/MSD was performed by the laboratory on a non-project sample, no qualification is required.

**ACTION:** MS/MSD flags only apply to the sample spiked. Do not evaluate if sample concentration is > 4X spike. If the recoveries of the MS and MSD exceed the upper control limit, qualify positive results as estimated (J). If the recoveries of the MS and MSD are lower than the lower control limit but > 30%, qualify both positive results and non-detects (J). If the MS/MSD recovery is < 30% and the sample is non-detect, the results are considered unusable and flagged (R).

**ACTION:** Laboratory control limits apply when spiked sample results fall within the normal calibration range. If dilutions are required due to high sample concentrations, the data is evaluated, but no flags are applied.

6.5 Are any RPDs for MS/MSD recoveries outside of the QA/QC limits?

NOTE:  $RPD = \frac{S-D}{(S+D)/2} \times 100\%$       Where S = MS result  
D = MSD result

Yes ☐      No ☒      N/A ☐      Comments:

**MS/MSD RPD Limits:**

$RPD \leq 20$

**7.0 Laboratory Duplicate**

Are the RPDs for the laboratory duplicates <20% unless otherwise specified below?

Yes ☒      No ☐      N/A ☐      Comments:

### Field Duplicate

lab_sample_id	field_sample_id	qc_code	param_name	final_result			
360-40979-6	OC-SW-PZ-18RSW	FS	Chloride	110	110	0	0%
360-40979-8	OC-SW-PZ-18RSW	FD	Chloride	110			
360-40979-6	OC-SW-PZ-18RSW	FS	LAB SPECIFIC CONDUCTANCE	640	640	0	0%
360-40979-8	OC-SW-PZ-18RSW	FD	LAB SPECIFIC CONDUCTANCE	640			
360-40979-6	OC-SW-PZ-18RSW	FS	Nitrate as N	0.27	0.27	0	0%
360-40979-8	OC-SW-PZ-18RSW	FD	Nitrate as N	0.27			
360-40979-6	OC-SW-PZ-18RSW	FS	Nitrogen, as Ammonia	28	25.5	5	20%
360-40979-8	OC-SW-PZ-18RSW	FD	Nitrogen, as Ammonia	23			
360-40979-6	OC-SW-PZ-18RSW	FS	Sulfate	97	97.5	1	1%
360-40979-8	OC-SW-PZ-18RSW	FD	Sulfate	98			

lab_sample_id	field_sample_id	qc_code	param_name	final_result	Average	Difference	RPD
360-40743-10	OC-GW-202D DUP	FD	Chloride	260	260	0	0%
360-40743-2	OC-GW-202D	FS	Chloride	260			
360-40743-10	OC-GW-202D DUP	FD	LAB SPECIFIC	4000	4000	0	0%
360-40743-2	OC-GW-202D	FS	LAB SPECIFIC	4000			
360-40743-10	OC-GW-202D DUP	FD	Nitrogen, as Ar	230	240	20	8%
360-40743-2	OC-GW-202D	FS	Nitrogen, as Ar	250			
360-40743-10	OC-GW-202D DUP	FD	Sulfate	1800	1750	100	6%
360-40743-2	OC-GW-202D	FS	Sulfate	1700			

### Field Duplicate

lab_sample_id	field_sample_id	qc_code	param_name	final_result	Average	Difference	RPD
360-40846-1	OC-GW-10S	FS	Chloride	4.6	4.5	0.2	0.0444
360-40846-11	OC-GW-DUP-10S	FD	Chloride	4.4			
360-40846-1	OC-GW-10S	FS	LAB SPECIFIC CONDUCTANCE	96	95.5	1	0.0105
360-40846-11	OC-GW-DUP-10S	FD	LAB SPECIFIC CONDUCTANCE	95			
360-40846-1	OC-GW-10S	FS	Nitrogen, as Ammonia	0.72	0.685	0.07	0.1022
360-40846-11	OC-GW-DUP-10S	FD	Nitrogen, as Ammonia	0.65			

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**ACTION:** If the RPD is greater than specified limits, qualify all results for that analyte as estimated (J).

pH\* ☐ = 3%

Specific Conductivity \*☒ = 5%

TSS\*\* ☐ = 6%

TDS\*\* ☐ = 6%

**8.0 Sampling Accuracy**

The majority of ground water samples are collected directly from a tap, process stream, or with dedicated tubing. Rinse blanks will not be collected.

8.1 Were rinsate blanks collected? Prior to evaluating rinsate blanks, obtain a list of the associated samples from the senior chemist.

Yes ☐ No ☒ N/A ☐ Comments:

8.2 Do any rinsate blanks have positive results?

Yes ☐ No ☐ N/A ☒ Comments:

**ACTION:** Evaluate rinsate results vs. blank results to determine if contaminant may be laboratory-derived. If not lab-related, qualify according to the table below.

If the sample concentration is  $< 5 \times$  blank value, flag sample result non-detect "U" at the PQL or the concentration reported if greater than the PQL.

If the sample concentration is  $> 5 \times$  blank value, no qualification is needed.

**NOTE:** MADEP does not require the collection of rinsate blanks.

**9.0 Field Duplicates**

9.1 Were field duplicate samples collected? Obtain a list of samples and their associated field duplicates.

Yes ☒ No ☐ N/A ☐ Comments:

9.2 Were field duplicates collected per the required frequency?

Yes ☒ No ☐ N/A ☐ Comments:

QAPP/IRSWP ☒ MADEP Option 1(1 per 20) ☐ MADEP Option 3 (1 per 10) ☐

9.3 Was the RPD  $\leq 30\%$  for waters  $\leq 50\%$  for soils? Calculate the RPD for results and attach to this review.

Yes ☒ No ☐ N/A ☐ Comments:

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**ACTION:.** Qualify data (J) for both sample results if the RPD exceeded.

Was any of the data qualified?

Yes ☒

No ☒

N/A ☐

Comments:

If so, apply data qualifiers directly to the DQE copy of laboratory report and **flag pages** for entry in database.

**REFERENCES:-**

MACTEC, 2007. "Draft Interim Response Steps Work Plan"; Olin Chemical Superfund Site, 51 Eames Street, Wilmington, Massachusetts.; Project No. 6300-06-0010/41.1; July 25, 2007.

MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols," WSC-CAM #10-320, Final, Revision No. 1, 5 July 2010.

MADEP, 2010. Massachusetts Department of Environmental Protection Bureau of Waste Site Cleanup, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data in Support of Action Conducted Under the Massachusetts Contingency Plan (MCP)," WSC-CAM, Section VIIA, Final, Revision No. 1, 1 July 2010.